

Appl. No. 10/659,181
Amdt. dated Dec. 1, 2005
Reply to Office action of Jul.1, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A method of packaging ball grid arrays, comprising:
 - a. providing a substrate having a plurality of holes formed therein, each hole associated with a respective one of a plurality of contact pads formed on a first surface of the substrate;
 - b. following said providing step (a), disposing a plurality of balls on a second surface of the substrate different from the first surface, within respective ones of the plurality of holes such that at least a portion of each ball projects outwardly from the first surface; and
 - c. applying a force to each of the balls outwardly ~~with a heated punch tool~~ from the first surface to couple the balls to the substrate.
2. (original) The method of Claim 1, wherein providing the substrate further comprises providing a tape substrate having a thickness of approximately 50 microns.
3. (original) The method of Claim 1, wherein providing the substrate further comprises providing a laminate substrate.
4. (original) The method of Claim 1, wherein the portion of each ball projects outwardly from the first surface by a distance of approximately 25 to 50 microns.
- 5-6. (canceled)
7. (original) The method of Claim 1, wherein applying the force to each of the balls comprises simultaneously applying the force to each of the balls.
8. (original) The method of Claim 1, wherein applying the force to each of the balls further comprises applying enough force to deform the tops of each ball such that a portion of each ball overlaps the substrate proximate an edge of its respective hole.
- 9-14. (canceled)

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15. (currently amended) A method of packaging ball grid arrays, comprising:
- a. providing a substrate having a plurality of holes formed therein, each hole formed within a respective one of a plurality of contact pads formed on a first surface of the substrate;
 - b. following said providing step (a), disposing, from below a second surface of the substrate different from the first surface, a plurality of balls within respective ones of the plurality of holes;
 - c. causing at least a portion of each ball to project outwardly from the first surface;
 - d. disposing a punch tool adjacent the first surface of the substrate, the punch tool having a plurality of punches arranged in a pattern that substantially matches a pattern of the balls;
 - e. heating the punch tool; and
 - f. applying a force to each of the balls with respective punches to couple the balls to the substrate.
16. (original) The method of Claim 15, wherein providing the substrate further comprises providing a tape substrate having a thickness of approximately 50 microns.
17. (original) The method of Claim 15, wherein providing the substrate further comprises providing a laminate substrate.
18. (original) The method of Claim 15, wherein the portion of each ball projecting outwardly from the first surface by a distance of approximately 25 to 50 microns.
19. (original) The method of Claim 15, wherein applying the force to each of the balls comprises simultaneously applying the force to each of the balls.
20. (original) The method of Claim 15, wherein applying the force to each of the balls further comprises applying enough force to deform the tops of each ball such that a portion of each ball overlaps the substrate proximate an edge of its respective hole.

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21. (previously presented) A method of packaging ball grid arrays, comprising:
- providing a substrate having a plurality of holes formed therein, each hole associated with a respective one of a plurality of contact pads formed on a first surface of the substrate;
- disposing a plurality of balls to the substrate having a plurality of holes and contact pads within respective ones of the plurality of holes such that at least a portion of each ball projects outwardly from the first surface; and
- applying a force to each of the balls outwardly from the first surface to couple the balls to the substrate.
22. (new) The method of claim 1, further comprising heat the punch tool.